

The Application of Augmented Reality Technology for the Anesthesiology Major

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Abstract: Anesthesiology is an important subject for in-depth research in the fields of clinical anesthesia, critical care medicine, first-aid and resuscitation, and pain treatment. As an important branch of clinical medicine, it has strong practicality and applicability. It has the commonality of clinical medicine and the specialty of anesthesiology. Carrying out anesthesiology practice teaching using augmented reality (AR) to simulate the experimental environment and scene simulation is of great significance to promoting the development of anesthesia practice teaching. This article mainly introduces the augmented reality technology. It not only analyzes the main forms of augmented reality technology in anesthesiology, but also explores the application of augmented reality technology for anesthesiology in the new era.

Keywords: Anesthesiology; Augmented Reality Technology; Practical Teaching

Nowadays, the application of intelligent technology is becoming more and more extensive and it is gradually developing and infiltrating from all walks of life. Medicine at the same time is also constantly developing and the level of anesthesia technology application is continuously improved. Through the application of augmented reality technology, medical students can truly see the virtual objects in the real world to create a fusion world when studying the anesthesiology courses, so that this technology will enhance the students' perception of the real-world. AR technology applications can also simulate learning objects where students can see virtual objects in the real environment to create a sense of immersion. With the aid of AR technology, the development of anesthesiology learning will enable an autonomous learning environment for students to visualize the closest images to the real interaction. This is very important for the teaching of some abstract content in the curriculum of anesthesiology.

1. The augmented reality (AR) technology

Compared with the virtual reality (VR) technology, the two technologies have certain common points, but there are also differences. VR technology is to create a complete virtual environment for learners to learn in a virtual environment. However, AR technology is to add some images with the help of camera equipments and angle calculations, so that the combination of real environment and virtual images allow students to use virtual technology in a real surrounding to achieve better environmental perception. In terms of the current AR technology, there are mainly the following two types:

1.1 AR technology based on display devices

This kind of augmented reality technology is to transfer the image data captured by the camera to the computer. Next, it integrates the corresponding pictures with other images in the computer, and synchronously transfer it onto the display. The process is similar to the

special effects added in the middle and late stages of a movie, but the difference is that this technology is applied in real-time, not in the later phase. This technical advantage is that with the help of a display users can watch the composite images without wearing another professional AR devices. The problem is that the precipitation of this system is not always satisfying. At present, such AR technology has been developed relatively well and it has been applied in many fields.

1.2 Optical perspective AR technology

This AR system uses a special headset display to present the information content. It includes two types of technologies: the videofluoroscopy AR and the optical AR. The first one is more or less similar to the display-based AR systems with which users can see the processed integrated image but not in the real environment. The optical AR technology, on the other hand, is to see the real environment and images processed by the camera through the display worn by the user, making the user feel totally immersed.

2. The main forms of application of AR technology in anesthesiology

Considering the current application forms of AR technology in anesthesiology, they mainly include the following three types: the desktop, headset, and hand-held AR devices.

2.1 The desktop AR device

The application of desktop AR device first appeared in the US virtual all-in-one machine in 2013, and has now evolved into the third generation. At present, this AR technology device has been applied in multi-disciplinary teaching. In the teaching of anesthesiology, teachers can give lessons with the desktop AR device to develop independent visions. In 2015, China introduced a desktop AR device platform that achieved coverage in primary and secondary school courses. This kind of equipment application realizes the on-site 3D effect by tracking the supporting devices. In the practical application of anesthesiology courses, teachers can use the holographic camera and projection equipment to display the images through the projector.

2.2 Application of helmet AR equipment

Equipment used here includes helmet displays, position trackers, and data gloves. The helmet displays also include two kinds of devices, namely mobile and split ones. In foreign countries, Google, Samsung, Microsoft, and other companies have already developed AR helmet-related products, and there are also companies, such as Storm Mirror, Wei Shiku, LeTV, Xiaomi, and Huawei, are doing research in such helmet AR devices. The application of this kind of equipment to the teaching of anesthesiology courses can help achieve real effects. Besides, with the help of related helmet equipment, the content in the teaching materials can become more vivid, touchable, and perceptible. When the teacher talks about the preparation of anesthetic drugs, students will wear the AR helmets through which they can see the specific drug-dispensing scenarios to understand the specific preparation process and dosage, etc., so that they can experience the preparation process of anesthetic drugs more directly.

2.3 The hand-held AR device

The application of this AR device is generally combined with apps or related mobile devices, such as software, 4D bookstores, AR handbooks, etc., all of which have corresponding support. The principle of application of this device is to use the mobile phone cameras to obtain images that exhibit characteristics through superimposing virtual images. This application can provide a wealth of educational and curriculum resources specifically for anesthesiology to meet the learning needs of students. Students can use the smart phone and the corresponding supporting handbook to present the AR effect. They can also be used to express abstract content images. In addition, app is used to realize the download of augmented reality resources and superimpose the display scenery. At present, real effects are able to be obtained to meet the needs of anesthesiology teaching.

3. Reflections on the application of augmented reality technology in anesthesiology

To realize the effectiveness of AR technology in anesthesiology teaching, professionals are urged to change their teaching thinking at this stage to introduce

the AR technology into teaching as soon as possible. To introduce the augmented reality technology into the teaching of anesthesiology, teachers must first understand that the application of this curriculum method needs to be distinguished from the traditional teaching method. With the aid of augmented reality technology, it can also change the traditional course teaching environment, in terms of which teachers are dominant in the traditional way whose words and deeds have a great impact on students' learning process. With the aid of AR technology, students are able to feel the real learning cases by wearing AR glasses. In this kind of setting, the role of teachers is not as obvious as before. In the traditional anesthesiology classroom, the studying content and progress are unified so teachers can control the teaching progress in the same way for all students whereas. With the assistant of AR tech, teachers do not need to control the progress of classroom teaching in a unified way and students can study at their own pace. The scenes seen in the virtual content overlay reality are different for each one so they can perform different operations with various knowledge from training on diversified interfaces. In this way, the specific teaching content often varies from person to person so that students can achieve personalized learning objectives according to their talent and aptitude and the learning efficiency will no doubt be significantly improved. In order to meet the curriculum teaching targets, teachers must grasp the characteristics and methods of AR application in the classrooms. They should change the traditional teaching ways with respect for students' dominant position. What's more, arranging the AR learning according to students' real needs is worthy of attention, and it is necessary to promote the AR tech in abstract knowledge teaching to improve the learning efficiency of students' majored in anesthesiology.

4. Summary

The realization of AR technology in anesthesiology

is of great significance to the development of anesthesiology teaching. At present, there are many types of AR devices available related to the anesthesiology major. Taking their responsibility in the teaching design, teachers need to grasp the combination of AR and traditional teaching methods. They should introduce AR assistance in a timely manner to promote the visualization of abstract-learning and professional teaching effectiveness.

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